

## **REMARKS**

Claims 1, 3-5, 7, 8 and 17-21 were pending in the Application prior to the outstanding Office Action. In the Office Action, claims 1, 3-5 and 17-21 were rejected under 35 U.S.C. §103(a) and claims 7 and 8 were objected to. Applicants will address each basis of rejection in sequence.

### **I. RESPONSE TO REJECTIONS UNDER 35 U.S.C. §103(a)**

In paragraph 2 of the Office Action mailed November 13, 2006, the Examiner rejected claims 1, 3, 17, 18, 20 and 21 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,116,848 issued to Thomas et al. ("*Thomas*"), in view of U.S. Patent No. 5,788,453 issued to Donde et al. ("*Donde*"). In paragraph 3 of the Office Action, the Examiner rejected claim 19 under 35 U.S.C. §103(a) as being unpatentable over *Thomas* in view of *Donde*, and further in view of U.S. Patent No. 5,988,971 issued to Fossey et al. ("*Fossey*"). In Paragraph 4 the Examiner rejected claims 4 and 5 under 35 U.S.C. §103(a) as being unpatentable over *Thomas* in view of *Donde*, and further in view of U.S. Patent No. 6,256,555 issued to Bacchi et al. ("*Bacchi*").

#### **A. Independent Claim 1 Patently Distinguishes over *Thomas* in view of *Donde***

Claim 1, in part, recites:

“a real-time force feedback system for generating an electrical signal representing the amount of force said contact pads exert on the peripheral edge of the wafer and sending said electrical signal to said motor assembly for dynamically adjusting the force exerted by said contact pads on the workpiece while said first and second gripper arms are located in said workpiece-engaging position.”

*Thomas* teaches moving a pair of contacts 48 by a solenoid 50. A solenoid is an electromagnet, and their use is limited to on-off applications such as latching, locking and triggering. Fig. 7 of *Thomas* illustrates that the current-varying signal for controlling the operation of the solenoid 50 is a square wave modulated by switching the solenoid 50 from on to off. Col. 5, line 63 - Col. 6, line 5. The Examiner cites the combination of the sensor processing (SCSP) 56 and robot controller 58 as a “real-time force feedback system.”

*Thomas* does not teach “a real-time force feedback system for generating an electrical signal representing the amount of force said contact pads exert on the peripheral edge of the wafer.” The force in a solenoid correlates to the position of the solenoid. SCSP 56 “monitors the status and position of a gripper mechanism via data from position capture electronics.” Col. 5, lines 56-58. In other words, the SCSP 56 measures the force in the solenoid 50 to determine whether the wafer is gripped or not by the contacts 48. The force measured by the SCSP 56 does not indicate “the amount of force said contact pads exert on the peripheral edge of the wafer.”

In addition, the SCSP 56 is not a control system that controls the position of the solenoid 50 while the contacts 48 are in contact with the wafer. SCSP “determines various diagnostic data from the back EMF, such as wafer presence, a solenoid health, and the gripper current position.” Col. 8, lines 4-6. *Thomas* does not teach or suggest “dynamically adjusting the force exerted by said contact pads on the workpiece while said first and second gripper arms are located in said workpiece-engaging position.” The SCSP 56 can only determine the position of the contacts 48, not the force the contacts apply to the peripheral edge of the wafer. Therefore, the end effector recited in claim 1 is not obvious over *Thomas*.

Moreover, *Donde* does not teach or suggest the elements missing in *Thomas*. Fig. 12 of *Donde* illustrates that the grippers are not “dynamically adjustable” after contacting the peripheral edge of the wafer. *Donde* teaches that (*see* Col. 10, lines 8-17):

at some net voltage,  $v_1$ , the gripper 106a contacts the wafer 102. Immediately thereafter, although the net voltage continues to increment, the gripper 106a does not bend further because the static frictional force of the wafer on the blade opposes further bending of the gripper 106a. At some net voltage,  $v_2$ , the stresses within the gripper 106a could be sufficiently high to overcome the frictional force of the wafer on the blade. If this net voltage  $v_2$  was reached, the gripper would resume bending and the wafer would move with respect to the blade.

*Donde* teaches that the gripper 106a stops bending at net voltage  $v_s$ . Col. 10, lines 18-21. As shown in Fig. 12, the voltage  $v_s$  is located between voltage  $v_1$  (initial contact of the gripper 106a with the wafer) and voltage  $v_2$  (movement of the wafer on the blade). *Donde* teaches that “after the net voltage reaches the value  $v_s$ , ... further bending of the gripper 106a ceases.” Col. 10, lines 24-28. The x axis of Fig. 12 represents “gripper bend” (e.g., motion of the gripper 106a) while the y axis represents “net voltage.” As shown in Fig. 12, once the gripper 106a contacts the peripheral edge of the wafer, the gripper bend remains constant. In other words, the

gripper 106a is not “dynamically [adjustable] ... while said first and second gripper arms are located in the said workpiece-engaging position.” Therefore, the end effector recited in claim 1 is not obvious over *Thomas* in view of *Donde*.

**B. Dependent Claims 3 Patently Distinguishes over *Thomas* in view of *Donde***

Dependent claim 3 depends directly or indirectly from independent claim 1. This dependent claim includes all of the limitations of the independent claim from which it depends. Applicants respectfully assert that dependent claim 3 is allowable for at least the reasons set forth above concerning independent claim 1.

**C. Independent Claim 17 Patently Distinguishes *Thomas* in view of *Donde***

Claim 17, in part, recites:

“a processor adapted to receive said electrical signal from each said force sensing device and sending an electrical signal to said motor assembly in order to dynamically adjust the position of said first and second contact arms while said first and second contact arms are in contact with the peripheral edge of the wafer.”

For at least the same reasons discussed above with regard to claim 1, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*.

**D. Dependent Claims 18, 20 and 21 Patently Distinguish over *Thomas* in view of *Donde***

Dependent claims 18, 20 and 21 depend directly or indirectly from independent claim 17. These dependent claims include all of the limitations of the independent claim from which they depend. Applicants respectfully assert that dependent claims 18, 20 and 21 are allowable for at least the reasons set forth above concerning independent claim 17.

**E. Dependent Claim 19 Patently Distinguishes over *Thomas* in view of *Donde* and Further in view of *Fossey***

Claim 19 depends directly from independent claim 17. As discussed above with regard to claim 17, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*. Therefore, claim 19 is not obvious over *Thomas* in view of *Donde*.

*Fossey* does not provide the element missing in the combination of *Thomas* and *Donde*. *Fossey* teaches that a “top edge gripper 32 is moved downwardly to clamp the wafer in position

on the paddle.” Col. 8, lines 27-28. *Fossey* does not teach or suggest that the gripper 32 may be “dynamically” adjusted after it is in contact with the wafer. Therefore, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*, and further in view of *Fossey*. Because claim 19 depends directly from independent claim 17, claim 19 is also not obvious over *Thomas* in view of *Donde*, and further in view of *Fossey*.

**F. Dependent Claims 4 and 5 Patently Distinguish over *Thomas* in view of *Donde* and Further in view of *Bacchi***

Claims 4-5 depend directly from independent claim 1. As discussed above with regard to claim 1, the end effector recited in claim 1 is not obvious over *Thomas* in view of *Donde*. Therefore, claims 4-5 are not obvious over *Thomas* in view of *Donde*.

*Bacchi* does not provide the element missing in the combination of *Thomas* and *Donde*. *Bacchi* teaches a vacuum actuated contact 50 that contacts the peripheral edge of the wafer. *Bacchi* does not teach or suggest that the vacuum contact 50 may be “dynamically” adjusted after it is in contact with the wafer. Therefore, the end effector recited in claim 17 is not obvious over *Thomas* in view of *Donde*, and further in view of *Bacchi*. Because claim 19 depends directly from independent claim 17, claim 19 is also not obvious over *Thomas* in view of *Donde*, and further in view of *Bacchi*.

**II. RESPONSE TO OBJECTION**

In the Office Action, claims 7 and 8 were objected to as being dependent upon a rejected base claim. Applicants have amended claim 7 by incorporating the limitations of claim 1 into claim 7. Applicants respectfully assert that amended claim 7 is therefore in condition for allowance.

### Additional Remarks

The references cited by the Examiner but not relied upon have been reviewed, but are not believed to render the claims unpatentable, either singly or in combination.


In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application are allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned before an advisory action is issued in order to avoid any unnecessary filing of an appeal.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-3548 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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By: \_\_\_\_\_

  
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